REMARKS

1. Summary of Final Office Action Mailed October 24, 2006

In the final office action mailed October 24, 2006, with claims 11-26 pending, the Examiner rejected claims 11-26 under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 6,137,281 (Philips et al.).

2. Pending claims

Presently pending in this application are claims 11-26, of which claims 11 and 17 are independent. No claims are amended herein.

3. The Prior Art

Philips discloses a magnetic back-to-back locator for identifying corresponding locations on two sides of an opaque surface. Philips discloses the use of two corresponding devices to accomplish this. Both devices have a marking arrangement, which is essentially an opening in each of the devices where a marking instrument can be used to mark the underlying surface. One of the two devices has multiple – such as 2 or 3 – magnetic sensors at particular locations. The second device has the same number of magnetic field generators (i.e., magnets) as the first device has sensors, at locations that match up with the sensors on the first device.

Philips discloses a number of arrangements, such as having two sensor/magnet pairs and the marking arrangement form a triangle or a straight line on each of the two devices, as well as having four sensor/magnet pairs form a cross on each of the two devices, with the marking arrangements at the center. In all of Philips' arrangements, there is a one-to-one correspondence between the sensors on the first device and the magnets on the second.

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Furthermore, Philips discloses having an indicator, such as a light emitting diode (LED), wired in series with each sensor on the first device. When a given sensor is lined up with a magnet on the second device on the other side of the opaque surface, the indicator lights up or gives some other sensory indication. Thus, when all of the indicators on the first device indicate a sensor/magnet alignment, the marking arrangement on the first device and the marking arrangement on the second device are at corresponding locations on either side of the opaque surface. Both sides of the surface can then be marked at the corresponding locations.

4. Response to Examiner's Rejections

In the final office action mailed October 24, 2006, the Examiner rejected claims 11-26 under 35 U.S.C. § 102(b) as anticipated by Philips. Among claims 11-26, the two independent claims are claims 11 and 17. For at least the reasons explained below, Applicant respectfully submits that Philips does not anticipate either of claims 11 or 17, and thus does not anticipate claims 12-16 or 18-26. Applicant respectfully requests reconsideration.

Also in the final office action, the Examiner indicated that the arguments in Applicant's 9/28/2006 response to the Examiner's 6/28/2006 office action were not persuasive because, according to the Examiner, Applicant relied in those arguments on features not recited in the rejected claims. Thus, in this response, Applicant more particularly points out the element or elements of the independent claims that are not disclosed by Philips.

Prior to that, however, Applicant wishes to stress that Philips discloses using two devices: a first device having a certain number of indicators, each associated with a sensor, the sensors arranged in a pattern, and a second device having the same number of magnets, arranged in a matching pattern. A user puts the first device on one side of a surface and the second device on the other, and then moves them around until all the indicators light up (as an example indication).

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The user then marks the surface on both sides in corresponding locations, which are indicated by a marking arrangement on the first device and a marking arrangement on the second device.

Applicant specifically wishes to stress that all of Philips's disclosed embodiments involve a one-to-one correspondence between the set of sensors on the first device and the set of magnets on the second device. Each sensor is disclosed as sensing either zero or one magnets. That is, each sensor is responsive to, at most, one magnetic field. When alignment is achieved, each sensor is sensing one magnet; more particularly, each sensor is sensing a different magnet. And all of Philips's embodiments disclose a binary, aligned-or-not-aligned indicator associated with each sensor/magnet pair. Basically, the user moves one or both devices around until all of the lights light up.

a. Claims 11-16

Claim 11 is directed to a method of locating an object lying behind an opaque surface, rendering the object non-visible. In one embodiment, the opaque surface may be the skin of an airplane wing, while the object may be a hole in a spar or rib to which the skin will be attached by drilling a hole through the skin, such that the hole in the skin and the hole in the spar are aligned, and then using a suitable fastener to join the two. In accordance with the method, a variable strength magnetic field is provided in the neighborhood of the object. This step may be carried out by, for example, placing a magnet or ferromagnetic object in the hole in the spar.

Also in accordance with the method, the magnetic field strength is sensed at a plurality of positions relative to the object using an array of Hall effect magnetic sensors, where the sensor array is associated geometrically with a machining guide, such that the machining guide and the sensor array are fixed positionally one relative to the other. (As examples, the sensor array could

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be a cruciform array, while the machining guide could be a cylindrical opening through which a drill bit may pass to drill a hole in the skin.)

Philips does not disclose using a magnetic-sensor array to sense the strength of a single magnetic field at a plurality of locations relative to an object, where a variable strength magnetic field is provided in the neighborhood of the object. Rather, as explained above, Philips discloses that each of multiple magnetic sensors sense a different respective magnetic field, where those respective magnetic fields are each provided at locations away from the object (i.e. Philips's marking arrangement) whose location is sought. For at least this independent reason, Philips does not anticipate claim 11.

Further in accordance with the method of claim 11, the sensors are interrogated to determine the value of the field strength at at least the majority of the sensors. Philips does not disclose this step either; specifically, Philips does not disclose determining the strength of a single magnetic field at more than one sensor. Again, the whole premise of Philips's disclosure is that each sensor is responsible for its corresponding magnet. For at least this independent reason, Philips does not anticipate claim 11.

The method of claim 11 further comprises analyzing the sensor responses to determine the displacement between the object and the machining guide, and moving the array and machining guide to a position in which the displacement is a minimum. Philips does not disclose these steps either; again, Philips does not disclose analyzing the responses of multiple magnetic-field sensors to determine a displacement between an object to be located and a machining guide. At most, Philips discloses determining whether or not the object and guide are aligned.

Displacement generally means a difference between two positions, which is a concept that generally involves both distance and direction (i.e. a vector) between the positions. It was

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on this point that, in the last response, the Examiner felt that Applicant was reading limitations from the specification into the claims. Applicant respectfully submits, however, that this distance-and-direction concept was already in the claims in the form of the term "displacement".

That is to say, under any reasonable definition of displacement, Philips does not disclose analyzing sensor responses to determine displacement between an object and machining guide. Rather, Philips only discloses determining, in a binary fashion and on a sensor-by-sensor basis, whether or not each sensor is aligned with a magnet on the other side of the surface.

Philips discloses no such analysis of sensor responses in any collective way to determine an output such as displacement. In Philips, an operator basically moves either or both of the sensor-containing device and the magnet-containing device until at least one sensor-indicator indicates alignment, and then essentially guesses which way to move or rotate one of the two devices to align it with the other. Again, Philips does not disclose determining displacement, but rather whether some or all of the sensors are aligned with respective magnets. For at least this independent reason, Philips does not anticipate claim 11.

Therefore, for at least the foregoing reasons, Philips does not anticipate claim 11. Furthermore, Philips does not anticipate dependent claims 12-16, for at least the reason that those claims depend from an allowable claim.

b. Claims 17-26

Claim 17 is directed to an apparatus for locating a non-visible object positioned behind an opaque surface. The apparatus comprises means to generate a variable strength magnetic field, a base member adapted to be placed on or against the surface, means in the base member defining a machining guide, and an array of Hall effect sensors located relative to the machining guide.

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The claimed apparatus also comprises means for collecting and analyzing outputs from at least some of the sensors to provide an indication of the variation of the magnetic field associated with the object relative to the position of the base member. Philips does not disclose this element, for at least the reason that Philips does not disclose collecting and analyzing the outputs of multiple magnetic-field sensors with respect to a single magnetic field. Rather, Philips discloses that the output of each magnetic-field sensor pertains to a different magnetic field. For at least this independent reason, Philips does not anticipate claim 17.

And Philips also does not disclose providing an indication of the variation of that single magnetic field relative to the position of a base member. This was another point with respect to which the Examiner felt Applicant's prior response imported limitations from the specification, particularly with respect to indicating in what way the base member may be misaligned with the magnetic field associated with the non-visible object, and with respect to indicating to a person or to a machine which way to move the apparatus to align it with the magnetic field.

However, Applicant respectfully submits that these arguments were and are based in the claim language; particularly, the provided indication would indicate how the single magnetic field varies (i.e. has different values) at the several sensors. This "variation" would be "relative to the position of the base member", where "relative" is generally understood to involve a comparison of values, rather than just an absolute value. And when those values are positions, it is fair to say that the comparison involves direction (i.e. in what way the base member may be misaligned with the magnetic field, and indicating to a person or machine which way to move the apparatus to align it with the magnetic field). Philips, on the other hand, discloses providing only simple, binary, sensor-by-sensor, aligned-or-not-aligned indications. For at least this independent reason, Philips does not anticipate claim 17.

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Therefore, for at least the foregoing reasons, Philips does not anticipate claim 17. Furthermore, Philips does not anticipate dependent claims 18-26, for at least the reason that those claims depend from an allowable claim.

5. Conclusion

Applicant submits that all of the pending claims are now in condition for allowance. Therefore, Applicant respectfully requests favorable action. Should the Examiner have any questions, the Examiner is encouraged to contact the undersigned at 312-913-3317.

Respectfully submitted,

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